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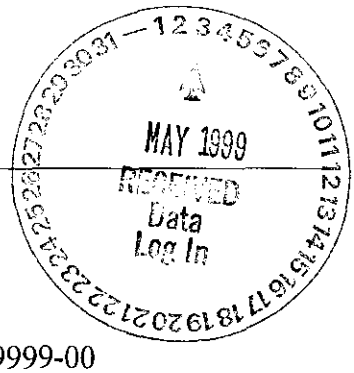
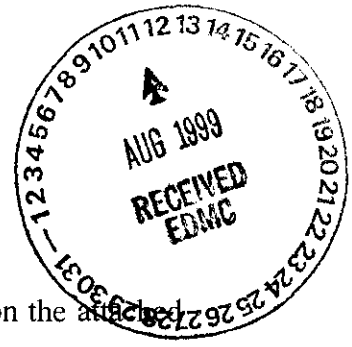


Recra LabNet Philadelphia
Analytical Report

Client : TNU HANFORD C99-023
RFW# : 9903L505
SDG/SAF# : H0359/C99-023

W.O.# : 10985-001-001-9999-00
Date Received: 03-20-99



METALS CASE NARRATIVE

1. This narrative covers the analyses of 4 water samples

2. Samples were prepared and analyzed in accordance with methods checked on the attached glossary.

3. All analyses were performed within the required holding times.

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits.

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. The preparation/method blanks for 3 analytes were outside method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

   a.) The MB results for Copper, Potassium, and Zinc were greater than the Practical Quantitation Limit (PQL) {3 x the (IDL) Instrument Detection Level} and all samples for Copper and Zinc and sample B0TW93 for Potassium read less than 20 times the MB concentration. However, no corrective action criteria for MBs were provided in SW846 method 6010B. The sample results were reported herein "uncorrected" for the levels found in the MB.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. All matrix spike (MS) and matrix spike duplicate (MSD) recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.

11. All MSs and MSDs were within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Matrix Spike Duplicate Report.

12. The duplicate analyses for 5 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

13. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

4-5-99
Date

mld/m03-505

METALS METHOD GLOSSARY

The following methods are used as reference for the digestion and analysis of samples contained within this Recra Lot#: 9903L505

Leaching Procedure: __1310 __1311 __1312 __Other:_____

CLP Metals __ Digestion and __ Analysis Methods: __ILM03.0 __ILM04.0

Metals Digestion Methods: ✓3005A __3010A __3015 __3020A __3050A __3051 __200.7 __SS17
__Other: _____

Metals Analysis Methods

	SW846	EPA	STD MTD	EPA OSWR	USATHAMA
Aluminum	✓6010B	__200.7			__99
Antimony	✓6010B __7041 [5]	__200.7 __204.2			__99
Arsenic	__6010B __7060A [5]	__200.7 __206.2	__3113B		__99
Barium	✓6010B	__200.7			__99
Beryllium	✓6010B	__200.7			__99
Bismuth	__6010B [1]	__200.7 [1]		__1620	__99
Boron	__6010B	__200.7			__99
Cadmium	✓6010B __7131A [5]	__200.7 __213.2			__99
Calcium	✓6010B	__200.7			__99
Chromium	✓6010B __7191 [5]	__200.7 __218.2			__SS17
Cobalt	✓6010B	__200.7			__99
Copper	✓6010B __7211 [5]	__200.7 __220.2			__99
Iron	✓6010B	__200.7			__99
Lead	__6010B __7421 [5]	__200.7 __239.2	__3113B		__99
Lithium	__6010B __7430 [4]	__200.7		__1620	__99
Magnesium	✓6010B	__200.7			__99
Manganese	✓6010B	__200.7			__99
Mercury	__7470A [3] __7471A [3]	__245.1 [2] __245.5 [2]			__99
Molybdenum	__6010B	__200.7			__99
Nickel	✓6010B	__200.7			__99
Potassium	✓6010B __7610 [4]	__200.7 __258.1 [4]			__99
Rare Earths	__6010B [1]	__200.7 [1]		__1620	__99
Selenium	__6010B __7740 [5]	__200.7 __270.2	__3113B		__99
Silicon	__6010B [1]	__200.7		__1620	__99
Silica	__6010B	__200.7		__1620	__99
Silver	✓6010B __7761 [5]	__200.7 __272.2			__99
Sodium	✓6010B __7770 [4]	__200.7 __273.1 [4]			__99
Strontium	✓6010B	__200.7			__99
Thallium	__6010B __7841 [5]	__200.7 __279.2 __200.9			__99
Tin	__6010B	__200.7			__99
Titanium	__6010B	__200.7			__99
Uranium	__6010B [1]	__200.7 [1]		__1620	__99
Vanadium	✓6010B	__200.7			__99
Zinc	✓6010B	__200.7			__99
Zirconium	__6010B [1]	__200.7 [1]		__1620	__99

Other:_____ Method:_____

METHOD REFERENCES AND DATA QUALIFIERS

DATA QUALIFIERS

U = Indicates that the parameter was not detected at or above the reported limit. The associated numerical value is the sample detection limit.

* = Indicates that the original sample result is greater than 4x the spike amount added.

ABBREVIATIONS

MB = Method or Preparation Blank.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
REP = Sample Replicate
LCS = Laboratory Control Sample.
NC = Not calculated.

ANALYTICAL METAL METHODS

1. Not included in the method element list.

2. Modified Hg: Hg1 and Hg2 require less total volume of digestate due to the autosampler analysis. Sample volumes and reagents for mercury determinations in water and soil have been proportionately scaled down to adapt to this semi-automated technique. The sample volume used for water analysis is 33 mL. For soils, 0.1 grams of sample is taken to a final volume of 50 mL (including all reagents).

3. Modified Hg: Hg1 and Hg2 require less total volume of digestate due to the autosampler analysis. Sample volumes and reagents for mercury determinations in water and soil have been proportionately scaled down to adapt to this semi-automated technique. The sample volume used for water analysis is 33 mL. For soils, three 0.1 gram of sample is taken to a final volume of 50 mL (including all reagents).

4. Flame AA.

5. Graphite Furnace AA.

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0TW93	Silver, Total	0.90 u	UG/L	0.90	1.0
		Aluminum, Total	28.7	UG/L	17.8	1.0
		Barium, Total	29.8	UG/L	0.10	1.0
		Beryllium, Total	0.10 u	UG/L	0.10	1.0
		Calcium, Total	40200	UG/L	6.8	1.0
		Cadmium, Total	0.40 u	UG/L	0.40	1.0
		Cobalt, Total	0.60 u	UG/L	0.60	1.0
		Chromium, Total	3.8	UG/L	0.60	1.0
		Copper, Total	2.4	UG/L	0.90	1.0
		Iron, Total	35.5	UG/L	17.9	1.0
		Potassium, Total	2160	UG/L	11.8	1.0
		Magnesium, Total	6630	UG/L	6.2	1.0
		Manganese, Total	0.98	UG/L	0.20	1.0
		Sodium, Total	5250	UG/L	3.3	1.0
		Nickel, Total	1.1 u	UG/L	1.1	1.0
		Antimony, Total	2.8	UG/L	2.3	1.0
		Strontium, Total	181	UG/L	0.10	1.0
		Vanadium, Total	5.1	UG/L	0.60	1.0
		Zinc, Total	6.6	UG/L	0.80	1.0

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INORGANICS DATA SUMMARY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	B0TW79	Silver, Total	0.90 u	UG/L	0.90	1.0
		Aluminum, Total	46.0	UG/L	17.8	1.0
		Barium, Total	26.1	UG/L	0.10	1.0
		Beryllium, Total	0.10 u	UG/L	0.10	1.0
		Calcium, Total	36500	UG/L	6.8	1.0
		Cadmium, Total	0.40 u	UG/L	0.40	1.0
		Cobalt, Total	0.60 u	UG/L	0.60	1.0
		Chromium, Total	2.0	UG/L	0.60	1.0
		Copper, Total	6.2	UG/L	0.90	1.0
		Iron, Total	161	UG/L	17.9	1.0
		Potassium, Total	3160	UG/L	11.8	1.0
		Magnesium, Total	10200	UG/L	6.2	1.0
		Manganese, Total	19.7	UG/L	0.20	1.0
		Sodium, Total	3360	UG/L	3.3	1.0
		Nickel, Total	3.1	UG/L	1.1	1.0
		Antimony, Total	4.1	UG/L	2.3	1.0
		Strontium, Total	237	UG/L	0.10	1.0
		Vanadium, Total	7.4	UG/L	0.60	1.0
		Zinc, Total	18.8	UG/L	0.80	1.0

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INORGANICS DATA SUMMARY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-005	B0TW95	Silver, Total	0.90 u	UG/L	0.90	1.0
		Aluminum, Total	23.2	UG/L	17.8	1.0
		Barium, Total	73.6	UG/L	0.10	1.0
		Beryllium, Total	0.10 u	UG/L	0.10	1.0
		Calcium, Total	115000	UG/L	6.8	1.0
		Cadmium, Total	0.40 u	UG/L	0.40	1.0
		Cobalt, Total	0.60 u	UG/L	0.60	1.0
		Chromium, Total	3.6	UG/L	0.60	1.0
		Copper, Total	3.4	UG/L	0.90	1.0
		Iron, Total	30.2	UG/L	17.9	1.0
		Potassium, Total	5790	UG/L	11.8	1.0
		Magnesium, Total	19000	UG/L	6.2	1.0
		Manganese, Total	0.58	UG/L	0.20	1.0
		Sodium, Total	42200	UG/L	3.3	1.0
		Nickel, Total	1.4	UG/L	1.1	1.0
		Antimony, Total	2.7	UG/L	2.3	1.0
		Strontium, Total	492	UG/L	0.10	1.0
		Vanadium, Total	2.8	UG/L	0.60	1.0
		Zinc, Total	9.2	UG/L	0.80	1.0

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INORGANICS DATA SUMMARY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-007	B0TW97	Silver, Total	1.4		UG/L	0.90	1.0
		Aluminum, Total	17.8	u	UG/L	17.8	1.0
		Barium, Total	75.2		UG/L	0.10	1.0
		Beryllium, Total	0.10	u	UG/L	0.10	1.0
		Calcium, Total	115000		UG/L	6.8	1.0
		Cadmium, Total	0.40	u	UG/L	0.40	1.0
		Cobalt, Total	0.60	u	UG/L	0.60	1.0
		Chromium, Total	5.5		UG/L	0.60	1.0
		Copper, Total	2.6		UG/L	0.90	1.0
		Iron, Total	22.7		UG/L	17.9	1.0
		Potassium, Total	5900		UG/L	11.8	1.0
		Magnesium, Total	19200		UG/L	6.2	1.0
		Manganese, Total	0.85		UG/L	0.20	1.0
		Sodium, Total	42400		UG/L	3.3	1.0
		Nickel, Total	1.5		UG/L	1.1	1.0
		Antimony, Total	2.3	u	UG/L	2.3	1.0
		Strontium, Total	498		UG/L	0.10	1.0
		Vanadium, Total	2.9		UG/L	0.60	1.0
		Zinc, Total	8.5		UG/L	0.80	1.0

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INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L0194-MB1	Silver, Total	0.90 u	UG/L	0.90	1.0
		Aluminum, Total	21.1	UG/L	17.8	1.0
		Barium, Total	1.2	UG/L	0.10	1.0
		Beryllium, Total	0.10 u	UG/L	0.10	1.0
		Calcium, Total	27.0	UG/L	6.8	1.0
		Cadmium, Total	0.40 u	UG/L	0.40	1.0
		Cobalt, Total	0.60 u	UG/L	0.60	1.0
		Chromium, Total	0.63	UG/L	0.60	1.0
		Copper, Total	3.8	UG/L	0.90	1.0
		Iron, Total	17.9 u	UG/L	17.9	1.0
		Potassium, Total	128	UG/L	11.8	1.0
		Magnesium, Total	8.9	UG/L	6.2	1.0
		Manganese, Total	0.30	UG/L	0.20	1.0
		Sodium, Total	88.7	UG/L	3.3	1.0
		Nickel, Total	1.1 u	UG/L	1.1	1.0
		Antimony, Total	3.2	UG/L	2.3	1.0
		Strontium, Total	0.10 u	UG/L	0.10	1.0
		Vanadium, Total	0.60 u	UG/L	0.60	1.0
		Zinc, Total	10.9	UG/L	0.80	1.0

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INORGANICS ACCURACY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B0TW93	Silver, Total	50.0	0.90u	50.0	100	1.0
		Silver, Total MSD	51.0	0.90u	50.0	102.0	1.0
		Aluminum, Total	2030	28.7	2000	100.1	1.0
		Aluminum, Total MSD	2090	28.7	2000	103.1	1.0
		Barium, Total	2000	29.8	2000	98.6	1.0
		Barium, Total MSD	2030	29.8	2000	100.1	1.0
		Beryllium, Total	50.1	0.10u	50.0	100.2	1.0
		Beryllium, Total MSD	50.7	0.10u	50.0	101.4	1.0
		Calcium, Total	65000	40200	25000	99.0	1.0
		Calcium, Total MSD	66500	40200	25000	104.9	1.0
		Cadmium, Total	49.7	0.40u	50.0	99.4	1.0
		Cadmium, Total MSD	50.2	0.40u	50.0	100.4	1.0
		Cobalt, Total	498	0.60u	500	99.6	1.0
		Cobalt, Total MSD	506	0.60u	500	101.2	1.0
		Chromium, Total	205	3.8	200	100.4	1.0
		Chromium, Total MSD	209	3.8	200	102.4	1.0
		Copper, Total	252	2.4	250	99.8	1.0
		Copper, Total MSD	262	2.4	250	104.0	1.0
		Iron, Total	1020	35.5	1000	98.6	1.0
		Iron, Total MSD	1050	35.5	1000	101.3	1.0
		Potassium, Total	27900	2160	25000	103.0	1.0
		Potassium, Total MSD	28500	2160	25000	105.3	1.0
		Magnesium, Total	31900	6630	25000	101.1	1.0
		Magnesium, Total MSD	32400	6630	25000	103.2	1.0
		Manganese, Total	509	0.98	500	101.7	1.0
		Manganese, Total MSD	518	0.98	500	103.5	1.0
		Sodium, Total	29600	5250	25000	97.3	1.0
		Sodium, Total MSD	30000	5250	25000	98.9	1.0
		Nickel, Total	493	1.1 u	500	98.6	1.0
		Nickel, Total MSD	498	1.1 u	500	99.5	1.0
		Antimony, Total	516	2.8	500	102.7	1.0
		Antimony, Total MSD	518	2.8	500	103.0	1.0
		Strontium, Total	1160	181	1000	97.9	1.0
		Strontium, Total MSD	1180	181	1000	99.9	1.0
		Vanadium, Total	514	5.1	500	101.9	1.0
		Vanadium, Total MSD	523	5.1	500	103.7	1.0
		Zinc, Total	494	6.6	500	97.4	1.0
		Zinc, Total MSD	506	6.6	500	100	1.0

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INORGANICS DUPLICATE SPIKE REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%DIFF
-001	B0TW93	Silver, Total	100	102.0	2.0
		Aluminum, Total	100.1	103.1	3.0
		Barium, Total	98.6	100.1	1.5
		Beryllium, Total	100.2	101.4	1.2
		Calcium, Total	99.0	104.9	5.9
		Cadmium, Total	99.4	100.4	1.0
		Cobalt, Total	99.6	101.2	1.7
		Chromium, Total	100.4	102.4	2.0
		Copper, Total	99.8	104.0	4.2
		Iron, Total	98.6	101.3	2.7
		Potassium, Total	103.0	105.3	2.2
		Magnesium, Total	101.1	103.2	2.0
		Manganese, Total	101.7	103.5	1.8
		Sodium, Total	97.3	98.9	1.6
		Nickel, Total	98.6	99.5	0.91
		Antimony, Total	102.7	103.0	0.35
		Strontium, Total	97.9	99.9	2.1
		Vanadium, Total	101.9	103.7	1.8
		Zinc, Total	97.4	100	2.6

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INORGANICS PRECISION REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	B0TW93	Silver, Total	0.90u	0.90u	NC	1.0
		Aluminum, Total	28.7	17.8 u	~~NC~~ 200	1.0
		Barium, Total	29.8	31.2	4.6	1.0
		Beryllium, Total	0.10u	0.10u	NC	1.0
		Calcium, Total	40200	41600	3.5	1.0
		Cadmium, Total	0.40u	0.40u	NC	1.0
		Cobalt, Total	0.60u	0.60u	NC	1.0
		Chromium, Total	3.8	4.6	19.0	1.0
		Copper, Total	2.4	2.1	13.3	1.0
		Iron, Total	35.5	20.9	51.8	1.0
		Potassium, Total	2160	2220	2.7	1.0
		Magnesium, Total	6630	6860	3.4	1.0
		Manganese, Total	0.98	0.93	5.2	1.0
		Sodium, Total	5250	5460	4.0	1.0
		Nickel, Total	1.1 u	1.8	~~NC~~ 200	1.0
		Antimony, Total	2.8	3.7	27.7	1.0
		Strontium, Total	181	188	3.8	1.0
		Vanadium, Total	5.1	5.5	7.5	1.0
		Zinc, Total	6.6	4.8	31.6	1.0

Corrections 4/5/99

Recra LabNet - Lionville

INORGANICS LABORATORY CONTROL STANDARDS REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	99L0194-LC1	Silver, LCS	517	500	UG/L	103.4
		Aluminum, LCS	5340	5000	UG/L	106.9
		Barium, LCS	5180	5000	UG/L	103.6
		Beryllium, LCS	255	250	UG/L	101.9
		Calcium, LCS	25800	25000	UG/L	103.2
		Cadmium, LCS	253	250	UG/L	101.2
		Cobalt, LCS	2550	2500	UG/L	102.1
		Chromium, LCS	516	500	UG/L	103.3
		Copper, LCS	1310	1250	UG/L	104.9
		Iron, LCS	5150	5000	UG/L	102.9
		Potassium, LCS	27100	25000	UG/L	108.3
		Magnesium, LCS	25800	25000	UG/L	103.4
		Manganese, LCS	785	750	UG/L	104.7
		Sodium, LCS	25900	25000	UG/L	103.8
		Nickel, LCS	2020	2000	UG/L	101.2
		Antimony, LCS	3070	3000	UG/L	102.2
		Strontium, LCS	5100	5000	UG/L	102.0
		Vanadium, LCS	2640	2500	UG/L	105.6
		Zinc, LCS	1010	1000	UG/L	101.1

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/20/99 RFW LOT # :9903L505

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B0TW93						
SILVER, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
SILVER, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
SILVER, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
SILVER, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
BARIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
BARIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
BARIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
BARIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
CALCIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
CALCIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
CALCIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
CALCIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
CADMIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
CADMIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
CADMIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
CADMIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
COBALT, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
COBALT, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
COBALT, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
COBALT, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
COPPER, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
COPPER, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
COPPER, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/20/99 RFW LOT # :9903L505

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
COPPER, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
IRON, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
IRON, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
IRON, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
IRON, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
MANGANESE, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
MANGANESE, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
MANGANESE, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
MANGANESE, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
SODIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
SODIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
SODIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
SODIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
NICKEL, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
NICKEL, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
NICKEL, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
NICKEL, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
VANADIUM, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99
VANADIUM, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
VANADIUM, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
VANADIUM, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
ZINC, TOTAL	001	W	99L0194	03/18/99	03/30/99	03/31/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/20/99 RFW LOT # :9903L505

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
ZINC, TOTAL	001 REP	W	99L0194	03/18/99	03/30/99	03/31/99
ZINC, TOTAL	001 MS	W	99L0194	03/18/99	03/30/99	03/31/99
ZINC, TOTAL	001 MSD	W	99L0194	03/18/99	03/30/99	03/31/99
B0TW79						
SILVER, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
ALUMINUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
BARIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
CALCIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
CADMIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
COBALT, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
CHROMIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
COPPER, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
IRON, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
POTASSIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
MANGANESE, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
SODIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
NICKEL, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
ANTIMONY, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
STRONTIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
VANADIUM, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
ZINC, TOTAL	003	W	99L0194	03/18/99	03/30/99	03/31/99
B0TW95						
SILVER, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
ALUMINUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
BARIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
CALCIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
CADMIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
COBALT, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
CHROMIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
COPPER, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
IRON, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/20/99 RFW LOT # :9903L505

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
POTASSIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
MANGANESE, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
SODIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
NICKEL, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
ANTIMONY, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
STRONTIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
VANADIUM, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
ZINC, TOTAL	005	W	99L0194	03/18/99	03/30/99	03/31/99
B0TW97						
SILVER, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
ALUMINUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
BARIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
CALCIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
CADMIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
COBALT, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
CHROMIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
COPPER, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
IRON, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
POTASSIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
MANGANESE, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
SODIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
NICKEL, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
ANTIMONY, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
STRONTIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
VANADIUM, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
ZINC, TOTAL	007	W	99L0194	03/18/99	03/30/99	03/31/99
LAB QC:						
SILVER LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
SILVER, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
ALUMINUM LABORTORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
ALUMINUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/20/99 RFW LOT # :9903L505

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
BARIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
BARIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
BERYLLIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
BERYLLIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
CALCIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
CALCIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
CADMIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
CADMIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
COBALT LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
COBALT, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
CHROMIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
CHROMIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
COPPER LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
COPPER, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
IRON LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
IRON, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
POTASSIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
POTASSIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
MAGNESIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
MAGNESIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
MANGANESE LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
MANGANESE, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
SODIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
SODIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
NICKEL LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
NICKEL, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
ANTIMONY LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
ANTIMONY, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
STRONTIUM LCS STANDA	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
STRONTIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
VANADIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
VANADIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
ZINC LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
ZINC, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99

RECRA LabNet Use Only

99031505

Custody Transfer Record/Lab Work Request

Page 1 of 1

RECRA LabNet

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS (8) metals dig.

Client: INEL-Hanford C99-023
Est. Final Proj. Sampling Date:
Project #: 10985-001-001-9999-00
Project Contact/Phone #:
RECRA Project Manager: OJ
QC: Spec Del: Std TAT: 30 day
Date Rec'd: 3/20/99 Date Due: 4/19/99
Account #:

Refrigerator #														3		3	3						
#/Type Container	Liquid													1p		1p	4g						
	Solid																						
Volume	Liquid													500		500	4hr						
	Solid																						
Preservatives														HNO3		-	H2SO4						
ANALYSES REQUESTED →		ORGANIC												INORG									
		VOA	BNA	Pest/PCB	Herb									Metal	CN								
		↓ RECRA LabNet Use Only ↓																					
														Metal Hubbard 3/24/99		INGD	1066R 1PHC						

MATRIX CODES	Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected																	
S - Soil, SE - Sediment, SO - Solid, SL - Sludge, W - Water, O - Oil, A - Air, DS - Drum Solids, DL - Drum Liquids, L - EP/TCLP Leachate, WI - Wipe, X - Other, F - Fish	001	BOTW93			W	3/18/99	-								✓									
	2	94					-										✓							
	3	79					1122								✓									
	4	80					⊥										✓							
	5	95					0845								✓									
	6	96															✓	✓						
	7	97													✓									
	8	98	✓	✓	⊥	⊥	⊥										✓	✓						

Special Instructions:

saf # C99-023
sdg # ~~H0395~~ 3/20/99
H0359

Comp Waste

019

DATE/REVISIONS:

Orig 1. ICCL, ICFL, ICNO2, ICNO3, ICSO4
2.
3. ~~Rerun matrix QC~~ 3/20/99
MetO= 4. Al, Sb, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Mg,
5. Mn, Ni, K, Ag, Na, Sr, V, Zn.
6. ~~X~~ 809459~~48~~4537

Relinquished by	Received by	Date	Time
Jelley	Fowler	3/20/99	0930

Relinquished by	Received by	Date	Time

ORIGINAL REWRITTEN

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

RECRA LabNet Use Only

Samples were: 1) Shipped ✓ or Hand Delivered
Airbill # *
2) Ambient or Chilled
3) Received In Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Time Y or N

COC Tape was: 1) Present on Outer Package Y or N; 2) Unbroken on Outer Package Y or N; 3) Present on Sample Y or N; 4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N
Cooler Temp. 4.8 °C

NO2 + NO3 out

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # C99-023-1

Page 1 of 1

Collector: M.C. DORSEY	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C99-023	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100NR2IAM(1) GW MONITORING, MARCH 1999	Logbook No.: WM-SML-H21	Ice Chest No.: SML-188 Temp. 4C
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235-7952-3552
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW93 (F)		W	3/18/99		1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW94		W	"	"	1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW94		W			1x20-mL P	Activity Scan	None
B0TW94		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW94		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW94		W			1x250-mL P	Tritium - H3	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	M.C. DORSEY	M.C. Dorsey	MAR 18 1999 1250	K.S. Laurs			MAR 18 1999 1250
Relinquished By			Date/Time	Received By			Date/Time
			MAR 18 1999 1410	Fed Ex			3-18-99
Relinquished By			Date/Time	Received By			Date/Time
Fed Ex			3-19-99 10:00	J R Corse			3-19-99 10:00
Relinquished By			Date/Time	Received By			Date/Time
Fed Ex			3.20.99 / 10:00	D J Jones			3.20.99 / 10.00

Matrix *

S = Soil		DS = Drum Solid	
SE = Sediment		DL = Drum Liqui	
SO = Solid		T = Tissue	
SL = Sludge		WI = Wine	
W = Water		L = Liquid	
O = Oil		V = Vegetation	
A = Air		X = Other	

SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

020

9903150505

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

11C359

C.O.C. # C99-023-4

Page 1 of 1

Collector: M.C. DORSEY	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C99-023	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100NR2IAM(1) GW MONITORING MARCH 1999	Logbook No.: WMSML H21	Ice Chest No.: SMC188 Temp.: 4C
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT VEHICLE	Bill of Lading/Air Bill No.: 4275-7952-3552
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW79 (F)		W	3-18-99	1122	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW80		W			1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW80		W			1x20-mL P	Activity Scan	None
B0TW80		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW80		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW80		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW80		W			1x250-mL P	Tritium - H3	None

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
M.C. DORSEY	MAR 18 1999	K.L. Cans	MAR 18 1999 1230
K.L. Cans	MAR 18 1999 1410	Fed Ex	3-18-99
Fed Ex	3-19-99 10:00	JR Cons	3-19-99 10:00
Fed Ex	3.20.99/10:00		3.20.99/10:00

Matrix *

S = Soil	DS = Drum Solid	SE = Sediment	DL = Drum Liqui
SO = Solid	T = Tissue	SL = Sludge	WI = Wine
W = Water	L = Liquid	O = Oil	V = Vegetation
A = Air	X = Other		

SAMPLE DISPOSAL ACTION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) | Disposed By | Date/Time

120

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

HC839

C.O.C. # C99-023-5

Page 1 of 1

Collector: M.C. DORSEY	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688	MSIN / FAX
SAF No.: C99-023	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code	
Project Title: 100NR2IAM(1) GW MONITORING MARCH 1999	Logbook No.: WHS 5ML H2	Ice Chest No.: SM6534	Temp.: 4c
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT VEHICLE	Bill of Lading/Air Bill No.: 4235 -7952 -3563	
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW95 (F)		W	3.18.99	0845	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW96		W			1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW96		W			1x20-mL P	Activity Scan	None
B0TW96		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW96		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW96		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW96		W			2x1000-mL G	Oil & Grease - 413.1	H2SO4 to pH <2 Cool 4C
B0TW96		W			2x1000-mL G	TPH (Total) - 418.1	HCl to pH <2 Cool 4C

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
M.C. DORSEY	MAR 18 1999 1250	K.J. Lang	MAR 18 1999 1250
K.J. Lang	1410 3-15-99	Fed Ex	3-16-99
Fed Ex	3-19-99 10:00	JR Donald JR Donald	3-19-99 10:00
Fed Ex	3.20.99 / 10:00	D. Johnson	3.20.99 / 10:00

Matrix *

S = Soil	DS = Drum Solid		
SE = Sediment	DL = Drum Liqui		
SO = Solid	T = Tissue		
SL = Sludge	WI = Wine		
W = Water	L = Liquid		
O = Oil	V = Vegetation		
A = Air	X = Other		

SAMPLE DISPOSITION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) | Disposed By | Date/Time

0220

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

11035

C99-023-6

Page 1 of 1

Collector: M.C. DORSEY	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688	MSIN / FAX
SAF No.: C99-023	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code	
Project Title: 100NR2/IAM(1) GW MONITORING, MARCH 1999	Logbook No.: WHC-SMC-HAN-21	Ice Chest No.: SIM1534	Temp.: 4C
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4735-7952-3563	
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW97 (F)		W	3-18-99	0845	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW98		W			1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW98		W			1x20-mL P	Activity Scan	None
B0TW98		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW98		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW98		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW98		W			2x1000-mL G	Oil & Grease - 413.1	H2SO4 to pH <2 Cool 4C
B0TW98		W			2x1000-mL G	TPH (Total) - 418.1	HCl to pH <2 Cool 4C

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
M.C. DORSEY	MAR 18 1999 1250	K.J. Langman	MAR 18 1999 1250
K.J. Langman	1410 3-18-99	Fed Ex	3-18-99
Fed Ex	3-19-99 10:00	JR Conner	3-19-99 10:00
Fed Ex	3-20-99 10:00	D. Hanson	3-20-99 10:00

Matrix *

S = Soil	SE = Sediment	SO = Solid	SL = Sludge
W = Water	O = Oil	A = Air	DS = Drum Solid
DL = Drum Liqui	T = Tissue	WI = Wine	L = Liquid
V = Vegetation	X = Other		

AMPLE ON: Disposal Method (e.g., Return to customer, per lab procedure, used in process) | Disposed By | Date/Time

023

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD C99-023
RFW# : 9903L505
SDG# : H0359
SAF# : C99-023

W.O. # : 10985-001-001-9999-00
Date Received: 03-20-99

INORGANIC CASE NARRATIVE

1. This narrative covers the analyses of 4 water samples.

2. The samples were prepared and analyzed in accordance with the methods indicated on the attached glossary.

3. Sample holding times as required by the method and/or contract were met with the exception of Nitrate and Nitrite.

4. The cooler temperature was recorded on the chain-of-custody.

5. The method blanks were within method criteria.

6. The Laboratory Control Samples (LCS) were within the laboratory control limits.

7. The matrix spike recoveries were within the 75-125% control limits.

8. The replicate analyses were within the 20% RPD control limit with the exception of Oil and Grease, however the replicate results were less than 10 times the reporting limit.

for Pete

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

4-26-99
Date

njp\i03-505

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

WET CHEMISTRY METHODS GLOSSARY FOR ANALYSIS OF WATER SAMPLES

	EPA 600	SW846	OTHER
Acidity	_305.1		
_Alkalinity _Bicarbonate _Carbonate	_310.1		
BOD	_405.1		_5210B (b)
Ion Chromatography:			
_Bromide ✓Chloride ✓Fluoride	✓300.0	_9056	
✓Nitrite ✓Nitrate _Phosphate	✓300.0	_9056	
✓Sulfate _Formate _Acetate _Oxalate	✓300.0	_9056	
Chloride	_325.2	_9251	
Chlorine Residual	_330.5 (mod)		
Cyanide Amenable to Chlorination	_335.2	_9010A	
Cyanide (Total)	_335.2	_9010A _9012	_ILM04.0 (e)
Cyanide, Weak Acid Dissociable			_412 (a) _4500CN-I (b)
COD	_410.4 (mod)		_5220 C (b)
Color	_110.2		
Corrosivity (by Coupon)		_1110 (mod)	
Chromium VI		_7196A	_3500Cr-D (b)
Fluoride	_340.2		
Hardness, Calcium	_215.2		
Hardness, Total	_130.2		
Iodide			_ASTM D19P202 (1)
Surfactant	_425.1		
_Nitrate-Nitrite _Nitrate _Nitrite	_353.2		
Ammonia	_350.3		
Total _Kjeldahl Nitrogen _Organic Nitrogen	_351.4		
Total _Organic _Inorganic Carbon	_415.1	_9060	
Oil and Grease	✓413.1	_9070	
_pH _pH, Paper	_150.1	_9040A _9041A	
Petroleum Hydrocarbons, Total Recoverable	✓418.1		
Phenol	_420.1 _420.2	_9065 _9066	
_Ortho Phosphate _Total Phosphate	_365.2		_4500-P B _C
Salinity			_210A (a) _2520B (b)
Settleable Solids	_160.5		
Sulfide	_376.2 _376.1	_9030A	
Reactive _Cyanide _Sulfide		_Sec 7.3	
Silica	_370.1		
Sulfite	_377.1		
Sulfate	_375.4	_9038	
Specific Conductance	_120.1	_9050	
Specific Gravity			_213E (a)
_TCLP _TCLV		_1311	
Synthetic Precipitation Leach		_1312	
Total _Dissolved _Suspended _Solids	160_.1_.2_.3		
Total Organic Halides	_450.1	_9020B	
Turbidity	_180.1		
Volatile Solids _Total _Dissolved _Suspended	_160.4		

Other:_____ Method:_____

02

METHOD REFERENCES AND DATA QUALIFIERS

DATA QUALIFIERS

U = Indicates that the parameter was not detected at or above the reported limit. The associated numerical value is the sample detection limit.

* = Indicates that the original sample result is greater than 4x the spike amount added.

ABBREVIATIONS

MB = Method or Preparation Blank.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
REP = Sample Replicate
LC = Laboratory Control Sample.
NC = Not calculated.

A suffix of -R, -S, or -T following these codes indicate a replicate, spike or sample duplicate analysis respectively.

ANALYTICAL WET CHEMISTRY METHODS

1. ASTM Standard Methods.

2. USEPA Methods for Chemical Analysis of Water and Wastes (USEPA 600/4-79-020).

3. Test Methods for Evaluating Solid Waste (USEPA SW-846).

a. Standard Methods for the Examination of Water and Waste, 16 ed., (1989).

b. Standard Methods for the Examination of Water and Waste, 17 ed., (1983)

c. Method of Soil Analysis, Part 1, Physical and Mineralogical Methods, 2nd. Ed. (1986)

d. Method of Soil Analysis, Part 2, Chemical and Microbiological Properties, Am. Soc. Agron., Madison, WI (1965)

e. USEPA Contract Laboratory Program, Statement of Work for Inorganic Analysis.

f. Code of Federal Regulations.

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 04/16/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	B0TW94	Chloride by IC	9.3	MG/L	0.25	1.0
		Fluoride by IC	0.50 u	MG/L	0.50	1.0
		Nitrite by IC	0.25 u	MG/L	0.25	1.0
		Nitrate by IC	26	MG/L	2.5	10
		Sulfate by IC	37.3	MG/L	2.5	10.0
-004	B0TW80	Chloride by IC	5.5	MG/L	0.25	1.0
		Fluoride by IC	0.50 u	MG/L	0.50	1.0
		Nitrite by IC	0.25 u	MG/L	0.25	1.0
		Nitrate by IC	36	MG/L	2.5	10
		Sulfate by IC	39.0	MG/L	2.5	10.0
-006	B0TW96	Chloride by IC	44.5	MG/L	2.5	10.0
		Fluoride by IC	0.50 u	MG/L	0.50	1.0
		Nitrite by IC	2.5 u	MG/L	2.5	10
		Nitrate by IC	49	MG/L	2.5	10
		Sulfate by IC	178	MG/L	12.5	50.0
		Oil & Grease Gravimetri	2.1	MG/L	1.0	1.0
		Petroleum Hydrocarbons	1.0 u	MG/L	1.0	1.0
-008	B0TW98	Chloride by IC	42.2	MG/L	2.5	10.0
		Fluoride by IC	0.50 u	MG/L	0.50	1.0
		Nitrite by IC	2.5 u	MG/L	2.5	10
		Nitrate by IC	49	MG/L	2.5	10
		Sulfate by IC	176	MG/L	12.5	50.0
		Oil & Grease Gravimetri	1.1	MG/L	1.0	1.0
		Petroleum Hydrocarbons	1.0 u	MG/L	1.0	1.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/16/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	99LIC034-MB1	Chloride by IC	0.25 u	MG/L	0.25	1.0
		Fluoride by IC	0.50 u	MG/L	0.50	1.0
		Nitrite by IC	0.25 u	MG/L	0.25	1.0
		Nitrate by IC	0.25 u	MG/L	0.25	1.0
		Sulfate by IC	0.25 u	MG/L	0.25	1.0
BLANK10	99LOG008-MB1	Oil & Grease Gravimetri	1.0 u	MG/L	1.0	1.0
BLANK10	99LHC003-MB1	Petroleum Hydrocarbons	1.0 u	MG/L	1.0	1.0

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 04/16/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-008	B0TW98	Chloride by IC	96.0	42.2	50.0	107.7	10.0
		Fluoride by IC	11.1	0.00	10.0	110.6	1.0
		Nitrite by IC	51	2.5 u	50	102.2	10
		Nitrate by IC	100	49	50	109.2	10
		Sulfate by IC	440	176	250	105.7	50.0
BLANK10	99LIC034-MB1	Chloride by IC	5.0	0.25u	5.0	99.2	1.0
		Fluoride by IC	10.8	0.50u	10.0	107.9	1.0
		Nitrite by IC	5.1	0.25u	5.0	101.6	1.0
		Nitrate by IC	4.9	0.25u	5.0	98.9	1.0
		Sulfate by IC	4.9	0.25u	5.0	98.6	1.0
BLANK10	99LOG008-MB1	Oil & Grease Gravimetr	34.6	1.0 u	34.1	101.4	1.0
		Oil & Grease - Grav M	32.1	1.0 u	36.8	87.3	1.0
BLANK10	99LHC003-MB1	Petroleum Hydrocarbons	4.1	1.0 u	4.2	97.3	1.0
		Petroleum Hydrocarbons	4.2	1.0 u	4.2	98.9	1.0

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INORGANICS DUPLICATE SPIKE REPORT 04/16/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%DIFF
BLANK10	99LOG008-MB1	Oil & Grease - Grav	101.4	87.3	14.9
BLANK10	99LHC003-MB1	Petroleum Hydrocarbons	97.3	98.9	1.6

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 04/16/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L505

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-008REP	B0TW98	Chloride by IC	42.2	44.6	5.5	10.0
		Fluoride by IC	0.50u	0.50u	NC	1.0
		Nitrite by IC	2.5 u	2.5 u	NC	10
		Nitrate by IC	49	50	2.0	10
		Sulfate by IC	176	177	0.58	50.0
		Oil & Grease Gravimetri	1.1	2.2	66.7	1.0
		Petroleum Hydrocarbons	1.0 u	1.0 u	NC	1.0

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/20/99 RFW LOT # :9903L505

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B0TW94						
CHLORIDE BY IC	002	W	99LIC034	03/18/99	03/23/99	03/23/99
FLUORIDE BY IC	002	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRITE BY IC	002	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRATE BY IC	002	W	99LIC034	03/18/99	03/23/99	03/23/99
SULFATE BY IC	002	W	99LIC034	03/18/99	03/23/99	03/23/99
B0TW80						
CHLORIDE BY IC	004	W	99LIC034	03/18/99	03/23/99	03/23/99
FLUORIDE BY IC	004	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRITE BY IC	004	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRATE BY IC	004	W	99LIC034	03/18/99	03/23/99	03/23/99
SULFATE BY IC	004	W	99LIC034	03/18/99	03/23/99	03/23/99
B0TW96						
CHLORIDE BY IC	006	W	99LIC034	03/18/99	03/23/99	03/23/99
FLUORIDE BY IC	006	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRITE BY IC	006	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRATE BY IC	006	W	99LIC034	03/18/99	03/23/99	03/23/99
SULFATE BY IC	006	W	99LIC034	03/18/99	03/23/99	03/23/99
OIL & GREASE BY GRAV	006	W	99LOG008	03/18/99	04/09/99	04/12/99
PETROLEUM HYDROCARBO	006	W	99LHC003	03/18/99	04/12/99	04/13/99
B0TW98						
CHLORIDE BY IC	008	W	99LIC034	03/18/99	03/23/99	03/23/99
CHLORIDE BY IC	008 REP	W	99LIC034	03/18/99	03/23/99	03/23/99
CHLORIDE BY IC	008 MS	W	99LIC034	03/18/99	03/23/99	03/23/99
FLUORIDE BY IC	008	W	99LIC034	03/18/99	03/23/99	03/23/99
FLUORIDE BY IC	008 REP	W	99LIC034	03/18/99	03/23/99	03/23/99
FLUORIDE BY IC	008 MS	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRITE BY IC	008	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRITE BY IC	008 REP	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRITE BY IC	008 MS	W	99LIC034	03/18/99	03/23/99	03/23/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/20/99 RFW LOT # :9903L505

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
NITRATE BY IC	008	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRATE BY IC	008 REP	W	99LIC034	03/18/99	03/23/99	03/23/99
NITRATE BY IC	008 MS	W	99LIC034	03/18/99	03/23/99	03/23/99
SULFATE BY IC	008	W	99LIC034	03/18/99	03/23/99	03/23/99
SULFATE BY IC	008 REP	W	99LIC034	03/18/99	03/23/99	03/23/99
SULFATE BY IC	008 MS	W	99LIC034	03/18/99	03/23/99	03/23/99
OIL & GREASE BY GRAV	008	W	99LOG008	03/18/99	04/09/99	04/12/99
OIL AND GREASE BY GR	008 REP	W	99LOG008	03/18/99	04/09/99	04/12/99
PETROLEUM HYDROCARBO	008	W	99LHC003	03/18/99	04/12/99	04/13/99
PETROLEUM HYDROCARBO	008 REP	W	99LHC003	03/18/99	04/12/99	04/13/99

LAB QC:

CHLORIDE BY IC	MB1	W	99LIC034	N/A	03/23/99	03/23/99
CHLORIDE BY IC	MB1 BS	W	99LIC034	N/A	03/23/99	03/23/99
FLUORIDE BY IC	MB1	W	99LIC034	N/A	03/23/99	03/23/99
FLUORIDE BY IC	MB1 BS	W	99LIC034	N/A	03/23/99	03/23/99
NITRITE BY IC	MB1	W	99LIC034	N/A	03/23/99	03/23/99
NITRITE BY IC	MB1 BS	W	99LIC034	N/A	03/23/99	03/23/99
NITRATE BY IC	MB1	W	99LIC034	N/A	03/23/99	03/23/99
NITRATE BY IC	MB1 BS	W	99LIC034	N/A	03/23/99	03/23/99
SULFATE BY IC	MB1	W	99LIC034	N/A	03/23/99	03/23/99
SULFATE BY IC	MB1 BS	W	99LIC034	N/A	03/23/99	03/23/99
OIL & GREASE BY GRAV	MB1	W	99LOG008	N/A	04/09/99	04/12/99
OIL AND GREASE BY GR	MB1 BS	W	99LOG008	N/A	04/09/99	04/12/99
OIL AND GREASE BY GR	MB1 BSD	W	99LOG008	N/A	04/09/99	04/12/99
PETROLEUM HYDROCARBO	MB1	W	99LHC003	N/A	04/12/99	04/13/99
PETROLEUM HYDROCARBO	MB1 BS	W	99LHC003	N/A	04/12/99	04/13/99
PETROLEUM HYDROCARBO	MB1 BSD	W	99LHC003	N/A	04/12/99	04/13/99

RECRA LabNet Use Only

99031505

Custody Transfer Record/Lab Work Request

Page 1 of 1

RECRA LabNet

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Client: INEL-Hanford C99-023
Est. Final Proj. Sampling Date:
Project #: 10985-001-001-9999-00
Project Contact/Phone #:
RECRA Project Manager: CJ
QC: Appr Del: Stnd TAT: 30 Day
Date Rec'd: 3/20/99 Date Due: 4/19/99
Account #:

Refrigerator #													3		3	3							
#/Type Container	Liquid												1p		1p	4g							
	Solid																						
Volume	Liquid												500		500	4L							
	Solid																						
Preservatives													HNO3		-	H2SO4							
ANALYSES REQUESTED →		ORGANIC											INORG										
		VOA	BNA	Pest/PCB	Herb								Metal	CN									
		RECRA LabNet Use Only																					
													MRCEAD		INCD	1064SR							
001	BOTW93			W	3/18/99	–							✓										
2	94					–									✓								
3	79					1122							✓										
4	80					⊥									✓								
5	95					0845							✓										
6	96														✓	✓							
7	97												✓										
8	98	✓	✓	⊥	⊥	⊥									✓	✓							

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Special Instructions:
SAF # C99-023
ADG # ~~H0375~~ 3/20/99
H0359

Comp Waste

DATE/REVISIONS:
1. Orig F ICCL, ICFL, ICNO2, ICNO3, ICSO4
2.
3. ~~Run matrix QC~~ 3/20/99
4.
5.
6. K 8094594537

Relinquished by	Received by	Date	Time
Dellaq	Fauer	3/20/99	0930

Relinquished by	Received by	Date	Time

ORIGINAL REWRITTEN

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

RECRA LabNet Use Only

Samples were:
1) Shipped or Hand Delivered
Airbill # *
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N
Cooler Temp 4.8 C

NO3 + NO3 out

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # C99-023-1

Page 1 of 1

Collector: M.C. DORSEY	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C99-023	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100NR2IAM(1) GW MONITORING MARCH 1999	Logbook No.: WM-SML-H21	Ice Chest No.: SML-188 Temp. 4C
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235-7952-3552
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW93 (F)		W	3.18.99		1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW94		W	〃	〃	1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW94		W	〃	〃	1x20-mL P	Activity Scan	None
B0TW94		W	〃	〃	1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW94		W	〃	〃	2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW94		W	〃	〃	1x250-mL P	Tritium - H3	None

Relinquished By	Print / Sign	Date/Time	Received By	Print / Sign	Date/Time
M.C. DORSEY	M.C. Dorsey	MAR 18 1999 1250	K.J. Lang	K.J. Lang	MAR 18 1999
Fed Ex		MAR 19 1999 1410	Fed Ex		3-19-99
Fed Ex		3-19-99 10:10	JR Corse	JR Corse	3-19-99 10:00
Fed Ex		3.20.99 / 10:00	D.L. Jones	D.L. Jones	3.20.99 / 10.00

Matrix *

S = Soil		DS = Drum Solid	
SE = Sediment		DL = Drum Liqui	
SO = Solid		T = Tissue	
SL = Sludge		WI = Wine	
W = Water		L = Liquid	
O = Oil		V = Vegetation	
A = Air		X = Other	

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process) — Disposed By — Date/Time

9903L.5205

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # C99-023-4

Page 1 of 1

116359

Collector: M.C. DORSEY	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C99-023	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100NR2IAM(1) GW MONITORING MARCH 1999	Logbook No.: WMSML H21	Ice Chest No.: SMCI88 Temp.: 4C
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT VEHICLE	Bill of Lading/Air Bill No.: 4135-7952-3552
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW79 (F)		W	3-18-99	1122	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW80		W			1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW80		W			1x20-mL P	Activity Scan	None
B0TW80		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW80		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW80		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW80		W			1x250-mL P	Tritium - H3	None

	Print	Sign	Date/Time
Relinquished By	M.C. DORSEY		MAR 18 1999 1220
Received By	K.L. Young		1250 MAR 18 1999
Relinquished By	K.L. Young		1410 MAR 18 1999
Received By	Fed Ex		3-18-99
Relinquished By	Fed Ex		3-19-99 10:00
Received By	B.C. Reese JR Corse		3-19-99 10:00
Relinquished By	Fed Ex		3-20-99/10:00
Received By	D. Young		3-20-99/10:00

Matrix *

S = Soil		DS = Drum Solid	
SE = Sediment		DL = Drum Liqui	
SQ = Solid		T = Tissue	
SL = Sludge		WI = Wine	
W = Water		L = Liquid	
O = Oil		V = Vegetation	
A = Air		X = Other	

FINAL SAMPLE DISPOSITION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) | Disposed By | Date/Time

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

H0359

C.O.C. # C99-023-5

Page 1 of 1

Collector M.C. DORSEY	Contact/Requester JH KESSNER	Telephone No. (509) 375-4688	MSIN FAX
SAF No. C99-023	Sampling Origin HANFORD SITE	Purchase Order/Charge Code	
Project Title 100NR2IAM(1) GW MONITORING, MARCH 1999	Logbook No. WMSML-HDI	Ice Chest No. SM4534	Temp. 4c
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT VEHICLE	Bill of Lading/Air Bill No. 4238-7952-3563	
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW95 (F)		W	3-18-99	0845	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW96		W			1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW96		W			1x20-mL P	Activity Scan	None
B0TW96		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW96		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW96		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW96		W			2x1000-mL G	Oil & Grease - 413.1	H2SO4 to pH <2 Cool 4C
B0TW96		W			2x1000-mL G	TPH (Total) - 418.1	HCl to pH <2 Cool 4C

Relinquished By	Print / Sign	Date/Time	Received By	Print / Sign	Date/Time
	M.C. DORSEY	MAR 18 1999			MAR 18 1999
Relinquished By		Date/Time	Received By		Date/Time
K.J. Lenz		1410 3-18-99	Fed Ex		3-16-99
Relinquished By		Date/Time	Received By		Date/Time
Fed Ex		3-19-99 10:00			3-19-99 10:00
Relinquished By		Date/Time	Received By		Date/Time
Fed Ex		3.20.99/10:00			3.20.99/10:00

Matrix *

S = Soil		DS = Drum Solid	
SE = Sediment		DL = Drum Liqui	
SO = Solid		T = Tissue	
SL = Sludge		WI = Wine	
W = Water		L = Liquid	
O = Oil		V = Vegetation	
A = Air		X = Other	

FINAL SAMPLE DISPOSITION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) | Disposed By | Date/Time

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

(16359)

C.O.C. # C99-023-6

Page 1 of 1

Collector: M.C. DORSEY	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C99-023	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100NR2IAM(1) GW MONITORING MARCH 1999	Logbook No.: WM-SML-HZ1	Ice Chest No.: SM6534 Temp.: 4C
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT VEHICLE	Bill of Lading/Air Bill No.: 4735-7952-3563
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW97 (F)		W	3-18-99	0845	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW98		W	"	"	1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW98		W			1x20-mL P	Activity Scan	None
B0TW98		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW98		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW98		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW98		W			2x1000-mL G	Oil & Grease - 413.1	H2SO4 to pH <2 Cool 4C
B0TW98		W			2x1000-mL G	TPH (Total) - 418.1	HCl to pH <2 Cool 4C

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
M.C. DORSEY M C Dorsey	MAR 18 1999 1250	K.L. Lang K L Lang	MAR 18 1999 1250
K.L. Lang K L Lang	1410 3-18-99	Fed Ex	3-18-99
Fed Ex	3-19-99 10:00	B R Conrad J R Conrad	3-19-99 10:00
Fed Ex	3-20-99 10:00	D. Jones	3-20-99 10:00

Matrix *

S = Soil		DS = Drum Solid	
SE = Sediment		DL = Drum Liqui	
SO = Solid		T = Tissue	
SL = Sludge		WI = Wine	
W = Water		L = Liquid	
O = Oil		V = Vegetation	
A = Air		X = Other	

FINAL SAMPLE DISPOSITION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) | Disposed By | Date/Time

Thermo NUtech
2030 Wright Avenue
P.O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 • FAX (510) 235-0438

May 7, 1999

Ms. Joan Kessner
3190 George Washington Way
Richland, WA 99352
MSIN: H9-03

Reference: P.O. #TRB-SBB-207925
Thermo Nutech N9-03-092-7098, SDG H0359

Dear Ms. Kessner:

Enclosed is the data report for four water samples designated under SAF No. C99-023 received at Thermo Nutech on March 19, 1999. The samples were analyzed according to the accompanying chain-of-custody documents.

Please call if you have any questions concerning this report.

Sincerely,

Terrie A. Higgins
Program Manager

TAH/kcj

Enclosure: Data Package

Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. Sample Delivery Group H0359 is comprised of four water samples designated under SAF No. C99-023 with a Project Designation of: 100NR2IAM(1)GW MONITORING MARCH 1999.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the TNU Sample Receipt Checklist. A complete data package was sent to Bechtel Hanford on May 7, 1999 vix fax.

2.0 ANALYSIS NOTES

2.1 Tritium Analyses

The aliquot for the analysis was reduced due to the sample matrix. The resultant increased MDA's reflect the decreased aliquot. No problems were encountered during the processing of the samples.

2.2 Strontium-90 Analyses

The aliquot for the analysis was reduced due to the sample matrix. The resultant increased MDA's reflect the decreased aliquot. No problems were encountered during the processing of the samples.

2.3 Gross Beta Analyses

The aliquot for the analysis was reduced due to the sample matrix. The resultant increased MDA's reflect the decreased aliquot. No problems were encountered during the processing of the samples.

2.4 Gamma Scan Analyses

The aliquot for the analysis was reduced due to the sample matrix. The resultant increased MDA's reflect the decreased aliquot. No problems were encountered during the processing of the samples.

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

SAMPLE SUMMARY

SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAF NO	CHAIN OF CUSTODY	COLLECTED
B0TW80	HANFORD SITE	WATER		N903092-02	C99-023	C99-023-4	03/18/99 11:22
B0TW94	HANFORD SITE	WATER		N903092-01	C99-023	C99-023-1	03/18/99
B0TW96	HANFORD SITE	WATER		N903092-03	C99-023	C99-023-5	03/18/99 08:45
B0TW98	HANFORD SITE	WATER		N903092-04	C99-023	C99-023-6	03/18/99 08:45
Method Blank		WATER		N903092-06	C99-023		
Lab Control Sample		WATER		N903092-05	C99-023		
Duplicate (N903092-01)	HANFORD SITE	WATER		N903092-07	C99-023		03/18/99
Duplicate (N903092-03)	HANFORD SITE	WATER		N903092-08	C99-023		03/18/99 08:45

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

QC SUMMARY

SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS RECEIVED	DAYS COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7098	C99-023-1	B0TW94	WATER				03/19/99	1	N903092-01	7098-001
	C99-023-4	B0TW80	WATER				03/19/99	1	N903092-02	7098-002
	C99-023-5	B0TW96	WATER				03/19/99	1	N903092-03	7098-003
	C99-023-6	B0TW98	WATER				03/19/99	1	N903092-04	7098-004
		Method Blank	WATER						N903092-06	7098-006
		Lab Control Sample	WATER						N903092-05	7098-005
		Duplicate (N903092-01)	WATER				03/19/99	1	N903092-07	7098-007
		Duplicate (N903092-03)	WATER				03/19/99	1	N903092-08	7098-008

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-QS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

PREP BATCH SUMMARY

SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

TEST	MATRIX	METHOD	PREPARATION BATCH	ERROR 2σ %	PLANCHETS ANALYZED CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	QUALIFIERS
Beta Counting												
Y	WATER	Strontium 90 in Water	2857-189	10.0	4			1	1	1/1		
Gas Proportional Counting												
82B	WATER	Gross Beta in Water	2857-189	15.0	4			1	1	1/1		
Gamma Scan												
GAM	WATER	Gamma Emitters	2857-189	15.0	3			1	1	1/1		
Liquid Scintillation Counting												
H	WATER	Tritium in Water	2857-189	10.0	2			1	1	1/1		

Duplicates and Matrix Spikes are those with original (Client) sample in this Sample Delivery Group.
Blank and LCS planchets are those in the same preparation batch as some Client, Duplicate or Spike sample.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-PBS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

WORK SUMMARY

SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

CLIENT SAMPLE ID / LOCATION / CUSTODY	SAF No	MATRIX	LAB SAMPLE ID / COLLECTED / RECEIVED	PLANCHET	TEST	SUF-FIX	ANALYZED	REVIEWED	BY	METHOD
B0TW80			N903092-02	7098-002	82B/82		04/01/99	05/07/99	TAH	Gross Beta in Water
HANFORD SITE		WATER	03/18/99	7098-002	GAM		05/01/99	05/07/99	TAH	Gamma Emitters
C99-023-4	C99-023		03/19/99	7098-002	H		04/09/99	05/07/99	TAH	Tritium in Water
				7098-002	Y		04/09/99	05/07/99	TAH	Strontium 90 in Water
B0TW94			N903092-01	7098-001	82B/82		04/01/99	05/07/99	TAH	Gross Beta in Water
HANFORD SITE		WATER	03/18/99	7098-001	H		04/09/99	05/07/99	TAH	Tritium in Water
C99-023-1	C99-023		03/19/99	7098-001	Y		04/08/99	05/07/99	TAH	Strontium 90 in Water
B0TW96			N903092-03	7098-003	82B/82		04/01/99	05/07/99	TAH	Gross Beta in Water
HANFORD SITE		WATER	03/18/99	7098-003	GAM		05/01/99	05/07/99	TAH	Gamma Emitters
C99-023-5	C99-023		03/19/99	7098-003	Y		04/08/99	05/07/99	TAH	Strontium 90 in Water
B0TW98			N903092-04	7098-004	82B/82		04/02/99	05/07/99	TAH	Gross Beta in Water
HANFORD SITE		WATER	03/18/99	7098-004	GAM		05/03/99	05/07/99	TAH	Gamma Emitters
C99-023-6	C99-023		03/19/99	7098-004	Y		04/08/99	05/07/99	TAH	Strontium 90 in Water
Method Blank			N903092-06	7098-006	82B/82		04/01/99	05/07/99	TAH	Gross Beta in Water
		WATER		7098-006	GAM		05/04/99	05/07/99	TAH	Gamma Emitters
	C99-023			7098-006	H		04/09/99	05/07/99	TAH	Tritium in Water
				7098-006	Y		04/09/99	05/07/99	TAH	Strontium 90 in Water
Lab Control Sample			N903092-05	7098-005	82B/82		04/02/99	05/07/99	TAH	Gross Beta in Water
		WATER		7098-005	GAM		05/04/99	05/07/99	TAH	Gamma Emitters
	C99-023			7098-005	H		04/09/99	05/07/99	TAH	Tritium in Water
				7098-005	Y		04/09/99	05/07/99	TAH	Strontium 90 in Water
Duplicate (N903092-01)			N903092-07	7098-007	82B/82		04/01/99	05/07/99	TAH	Gross Beta in Water
HANFORD SITE		WATER	03/18/99	7098-007	H		04/09/99	05/07/99	TAH	Tritium in Water
	C99-023		03/19/99	7098-007	Y		04/08/99	05/07/99	TAH	Strontium 90 in Water
Duplicate (N903092-03)			N903092-08	7098-008	GAM		05/04/99	05/07/99	TAH	Gamma Emitters
HANFORD SITE		WATER	03/18/99							
	C99-023		03/19/99							

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CWS
Version 3.06
Report date 05/12/99

SDG 7098
Contact L.A. Johnson

WORK SUMMARY, cont.

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
82B/82	C99-023	Gross Beta in Water	EPA900.0	4			1	1	1	7
GAM	C99-023	Gamma Emitters	GAMMAHI	3			1	1	1	6
H	C99-023	Tritium in Water	EPA906.0	2			1	1	1	5
Y	C99-023	Strontium 90 in Water	SR90Y90	4			1	1	1	7
TOTALS				13			4	4	4	25

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CWS
Version 3.06
Report date 05/12/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0359

N903092-06 Method Blank

METHOD BLANK

SDG 7098 Client/Case no Hanford SDG-H0359
Contact L.A. Johnson Case no TRB-SBB-207925

Lab sample id N903092-06 Client sample id Method Blank
Dept sample id 7098-006 Material/Matrix WATER
SAF No C99-023

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	-0.639	1.5	2.6	4.0	U	82B
Tritium	10028-17-8	-20.2	100	180	400	U	H
Strontium 90	10098-97-2	-0.097	0.15	0.33	2.0	U	Y
Potassium 40	13966-00-2	U		140		U	GAM
Cobalt 60	10198-40-0	U		7.1	25	U	GAM
Cesium 137	10045-97-3	U		6.6	15	U	GAM
Europium 152	14683-23-9	U		19	50	U	GAM
Europium 154	15585-10-1	U		21	50	U	GAM
Europium 155	14391-16-3	U		18	50	U	GAM
Americium 241	14596-10-2	U		16		U	GAM
Uranium 238	U-238	U		950		U	GAM
Uranium 235	15117-96-1	U		27		U	GAM

100NR21AM(1)GW MONITORING,MARCH 1999

QC-BLANK 30394

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

N903092-05

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7098

Contact L.A. Johnson

Client/Case no Hanford SDG-H0359

Case no TRB-SBB-207925

Lab sample id N903092-05

Dept sample id 7098-005

Client sample id Lab Control Sample

Material/Matrix WATER

SAF No C99-023

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Gross Beta	83.7	3.7	2.1	4.0		82B	84.0	3.4	100	76-124	
Tritium	7150	260	180	400		H	7260	290	98	83-117	80-120
Strontium 90	12.4	0.80	0.33	2.0		Y	11.5	0.46	108	80-120	80-120
Cobalt 60	532	24	11	25		GAM	530	21	100	76-124	80-120
Cesium 137	552	21	13	15		GAM	572	23	96	77-123	80-120

100NR21AM(1)GW MONITORING,MARCH 1999

QC-LCS 30393

Lab id TMANC

Protocol Hanford

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

N903092-07

B0TW94

DUPLICATE

SDG 7098 | Client/Case no Hanford | SDG-H0359

Contact L.A. Johnson | Case no TRB-SBB-207925

DUPLICATE | ORIGINAL

Lab sample id N903092-07 | Lab sample id N903092-01 | Client sample id B0TW94

Dept sample id 7098-007 | Dept sample id 7098-001 | Location/Matrix HANFORD SITE | WATER

Received 03/19/99 | Collected 03/18/99

Custody/SAF No C99-023-1 | C99-023

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Gross Beta	1950	21	3.2	4.0		82B	2010	21	3.9		3	32
Tritium	43000	600	180	400		H	44300	610	180		3	21
Strontium 90	1050	44	5.0	2.0		Y	1050	35	5.2		0	23

100NR21AM(1)GW MONITORING,MARCH 1999

QC-DUP#1 30395

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

N903092-08 B0TW96

DUPLICATE

SDG 7098 Client/Case no Hanford SDG-H0359

Contact L.A. Johnson Case no TRB-SBB-207925

DUPLICATE	ORIGINAL	
Lab sample id N903092-08	Lab sample id N903092-03	Client sample id B0TW96
Dept sample id 7098-008	Dept sample id 7098-003	Location/Matrix HANFORD SITE WATER
	Received 03/19/99	Collected 03/18/99 08:45
		Custody/SAF No C99-023-5 C99-023

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Potassium 40	U		140		U	GAM	U		250	U	-	
Cobalt 60	U		6.7	25	U	GAM	U		16	U	-	
Cesium 137	U		5.4	15	U	GAM	U		15	U	-	
Europium 152	U		15	50	U	GAM	U		40	U	-	
Europium 154	U		16	50	U	GAM	U		46	U	-	
Europium 155	U		15	50	U	GAM	U		38	U	-	
Americium 241	U		13		U	GAM	U		45	U	-	
Uranium 238	U		610		U	GAM	U		1700	U	-	
Uranium 235	U		20		U	GAM	U		58	U	-	

100NR21AM(1)GW MONITORING,MARCH 1999

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 05/12/99

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0359

N903092-02 B0TW80

DATA SHEET

SDG	7098	Client/Case no	Hanford SDG-H0359
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N903092-02	Client sample id	B0TW80
Dept sample id	7098-002	Location/Matrix	HANFORD SITE WATER
Received	03/19/99	Collected	03/18/99 11:22
		Custody/SAF No	C99-023-4 C99-023

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	11.8	2.4	3.2	4.0		82B
Tritium	10028-17-8	32600	530	180	400		H
Strontium 90	10098-97-2	4.29	1.3	3.0	2.0		Y
Potassium 40	13966-00-2	U		110		U	GAM
Cobalt 60	10198-40-0	U		9.0	25	U	GAM
Cesium 137	10045-97-3	16.0	8.1	8.9	15		GAM
Europium 152	14683-23-9	U		19	50	U	GAM
Europium 154	15585-10-1	U		20	50	U	GAM
Europium 155	14391-16-3	U		18	50	U	GAM
Americium 241	14596-10-2	U		17		U	GAM
Uranium 238	U-238	U		900		U	GAM
Uranium 235	15117-96-1	U		25		U	GAM

100NR21AM(1)GW MONITORING,MARCH 1999

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	05/12/99

N903092-01 B0TW94

DATA SHEET

SDG	7098	Client/Case no	Hanford SDG-H0359
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N903092-01	Client sample id	B0TW94
Dept sample id	7098-001	Location/Matrix	HANFORD SITE WATER
Received	03/19/99	Collected	03/18/99
		Custody/SAF No	C99-023-1 C99-023

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	2010	21	3.9	4.0		82B
Tritium	10028-17-8	44300	610	180	400		H
Strontium 90	10098-97-2	1050	35	5.2	2.0		Y

100NR21AM(1)GW MONITORING,MARCH 1999

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 05/12/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0359

N903092-03 B0TW96

DATA SHEET

SDG 7098	Client/Case no Hanford	SDG-H0359	
Contact L.A. Johnson	Case no TRB-SBB-207925		
Lab sample id N903092-03	Client sample id B0TW96		
Dept sample id 7098-003	Location/Matrix HANFORD SITE	WATER	
Received 03/19/99	Collected 03/18/99 08:45		
	Custody/SAF No C99-023-5	C99-023	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	864	14	4.0	4.0		82B
Strontium 90	10098-97-2	443	20	5.5	2.0		Y
Potassium 40	13966-00-2	U		250		U	GAM
Cobalt 60	10198-40-0	U		16	25	U	GAM
Cesium 137	10045-97-3	U		15	15	U	GAM
Europium 152	14683-23-9	U		40	50	U	GAM
Europium 154	15585-10-1	U		46	50	U	GAM
Europium 155	14391-16-3	U		38	50	U	GAM
Americium 241	14596-10-2	U		45		U	GAM
Uranium 238	U-238	U		1700		U	GAM
Uranium 235	15117-96-1	U		58		U	GAM

100NR21AM(1)GW MONITORING,MARCH 1999

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 05/12/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0359

N903092-04 B0TW98

DATA SHEET

SDG 7098	Client/Case no Hanford	SDG-H0359	
Contact L.A. Johnson	Case no TRB-SBB-207925		
Lab sample id N903092-04	Client sample id B0TW98		
Dept sample id 7098-004	Location/Matrix HANFORD SITE	WATER	
Received 03/19/99	Collected 03/18/99 08:45		
	Custody/SAF No C99-023-6	C99-023	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	765	14	4.2	4.0		82B
Strontium 90	10098-97-2	431	17	4.6	2.0		Y
Potassium 40	13966-00-2	U		69		U	GAM
Cobalt 60	10198-40-0	U		5.0	25	U	GAM
Cesium 137	10045-97-3	U		4.4	15	U	GAM
Europium 152	14683-23-9	U		13	50	U	GAM
Europium 154	15585-10-1	U		12	50	U	GAM
Europium 155	14391-16-3	U		11	50	U	GAM
Americium 241	14596-10-2	U		11		U	GAM
Uranium 238	U-238	U		550		U	GAM
Uranium 235	15117-96-1	U		17		U	GAM

100NR21AM(1)GW MONITORING,MARCH 1999

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

METHOD SUMMARY

STRONTIUM 90 IN WATER

BETA COUNTING

Test Y Matrix WATER
SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Strontium 90
Preparation batch 2857-189					
B0TW80	N903092-02			7098-002	4.29
B0TW94	N903092-01			7098-001	1050
B0TW96	N903092-03			7098-003	443
B0TW98	N903092-04			7098-004	431
BLK (QC ID=30394)	N903092-06			7098-006	U
LCS (QC ID=30393)	N903092-05			7098-005	ok
Duplicate (N903092-01)	N903092-07			7098-007	ok
Nominal values and limits from method				RDLs (pCi/L)	2.0
100NR21AM(1)GW MONITORING,MARCH 1999					

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 2857-189	2σ prep error 10.0 %			Reference Lab		Notebook #2857 pg. 189										
B0TW80	N903092-02			3.0	0.100			80		200			22	04/09/99	04/09	GRB-207
B0TW94	N903092-01			5.2	0.100			77		60			22	04/09/99	04/08	GRB-229
B0TW96	N903092-03			5.5	0.100			74		60			22	04/09/99	04/08	GRB-204
B0TW98	N903092-04			4.6	0.100			82		60			22	04/09/99	04/08	GRB-205
BLK (QC ID=30394)	N903092-06			0.33	1.00			79		200				04/09/99	04/09	GRB-208
LCS (QC ID=30393)	N903092-05			0.33	1.00			76		200				04/09/99	04/09	GRB-201
Duplicate (N903092-01) (QC ID=30395)	N903092-07			5.0	0.100			78		60			22	04/09/99	04/08	GRB-232
Nominal values and limits from method				2.0	1.00			20-105		25			180			

PROCEDURES REFERENCE SR90Y90
EP-040 Environmental Water Dissolution, rev 1
EP-520 Yttrium Purification for Strontium-90 Analysis, rev 0

AVERAGES ± 2 SD FOR 7 SAMPLES
MDA 3.4 ± 4.5
YIELD 78 ± 5

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

METHOD SUMMARY

GROSS BETA IN WATER

GAS PROPORTIONAL COUNTING

Test 82B Matrix WATER
SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	1: Gross Beta	2: Sum, Beta Emitters	RESULT RATIO (%) 2+1	2σ
Preparation batch 2857-189								
B0TW80	N903092-02	82		7098-002	11.8	20.3	172	85
B0TW94	N903092-01	82		7098-001	2010	1050	52	10
B0TW96	N903092-03	82		7098-003	864	443	51	10
B0TW98	N903092-04	82		7098-004	765	431	56	10
BLK (QC ID=30394)	N903092-06	82		7098-006	U			
LCS (QC ID=30393)	N903092-05	82		7098-005	ok			
Duplicate (N903092-01)	N903092-07	82		7098-007	ok	1050	54	10
Nominal values and limits from method				RDLs (pCi/L)	4.0			
100NR21AM(1)GW MONITORING,MARCH 1999							Average	77

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	RESID mg	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 2857-189	2σ prep error 15.0 %			Reference Lab	Notebook #2857 pg. 189											
B0TW80	N903092-02	82		3.2	0.200			29	100				14	04/01/99	04/01	GRB-111
B0TW94	N903092-01	82		3.9	0.200			24	100				14	04/01/99	04/01	GRB-110
B0TW96	N903092-03	82		4.0	0.200			120	100				14	04/01/99	04/01	GRB-112
B0TW98	N903092-04	82		4.2	0.200			122	100				15	04/01/99	04/02	GRB-110
BLK (QC ID=30394)	N903092-06	82		2.6	0.300			35	100					04/01/99	04/01	GRB-110
LCS (QC ID=30393)	N903092-05	82		2.1	0.300			35	100					04/01/99	04/02	GRB-111
Duplicate (N903092-01) (QC ID=30395)	N903092-07	82		3.2	0.200			31	100				14	04/01/99	04/01	GRB-111
Nominal values and limits from method				4.0	0.300			5-150	100				180			

PROCEDURES REFERENCE EPA900.0
EP-120 Gross Alpha and Gross Beta in Environmental Water, rev 2

AVERAGES ± 2 SD FOR 7 SAMPLES
MDA 3.3 ± 1.6
RESIDUE 57 ± 88

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

METHOD SUMMARY

GAMMA EMITTERS

GAMMA SCAN

Test GAM Matrix WATER
SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Cobalt 60		Cesium 137	
Preparation batch 2857-189								
B0TW80	N903092-02			7098-002	U		16.0	
B0TW96	N903092-03			7098-003	U		U	
B0TW98	N903092-04			7098-004	U		U	
BLK (QC ID=30394)	N903092-06			7098-006	U		U	
LCS (QC ID=30393)	N903092-05			7098-005	ok		ok	
Duplicate (N903092-03)	N903092-08			7098-008	-	U	-	U
Nominal values and limits from method 100NR21AM(1)GW MONITORING,MARCH 1999				RDLs (pCi/L)	25		15	

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MAX MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 2857-189 2σ prep error 15.0 % Reference Lab Notebook #2857 pg. 189																
B0TW80	N903092-02			8.9	0.500					401			44	03/26/99	05/01	01,04,00
B0TW96	N903092-03			15	0.500					411			44	03/26/99	05/01	01,03,00
B0TW98	N903092-04			4.4	0.500					927			46	03/26/99	05/03	01,04,00
BLK (QC ID=30394)	N903092-06			6.6	0.500					401				03/26/99	05/04	01,04,00
LCS (QC ID=30393)	N903092-05			13	0.500					452				03/26/99	05/04	01,04,00
Duplicate (N903092-03) (QC ID=30396)	N903092-08			5.4	0.500					608			47	03/26/99	05/04	01,04,00
Nominal values and limits from method				15	0.500					400			180			

PROCEDURES REFERENCE GAMMAHI
EP-100 Ge(Li) Preparation for Environmental Samples, rev 0

AVERAGES ± 2 SD FOR 6 SAMPLES
MDA 8.9 ± 8.6
YIELD ____ ± ____

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0359

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION COUNTING

Test H Matrix WATER
SDG 7098
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Tritium
Preparation batch 2857-189					
B0TW80	N903092-02			7098-002	32600
B0TW94	N903092-01			7098-001	44300
BLK (QC ID=30394)	N903092-06			7098-006	U
LCS (QC ID=30393)	N903092-05			7098-005	ok
Duplicate (N903092-01)	N903092-07			7098-007	ok
Nominal values and limits from method				RDLs (pCi/L)	400
100NR21AM(1)GW MONITORING,MARCH 1999					

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 2857-189	2σ prep error 10.0 %			Reference Lab		Notebook #2857 pg. 189										
B0TW80	N903092-02			180	0.0100		100			120			22	04/07/99	04/09	LSC-005
B0TW94	N903092-01			180	0.0100		100			120			22	04/07/99	04/09	LSC-005
BLK (QC ID=30394)	N903092-06			180	0.0100		100			120				04/07/99	04/09	LSC-005
LCS (QC ID=30393)	N903092-05			180	0.0100		100			120				04/07/99	04/09	LSC-005
Duplicate (N903092-01) (QC ID=30395)	N903092-07			180	0.0100		100			120			22	04/07/99	04/09	LSC-005
Nominal values and limits from method				400	0.0100					25			180			

PROCEDURES REFERENCE EPA906.0
EP-210 Tritium in Water by Distillation, rev 0

AVERAGES ± 2 SD MDA 180 ± 0
FOR 5 SAMPLES YIELD 100 ± 0

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

SDG 7098
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

SAMPLE SUMMARY

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

* LAB SAMPLE ID is the lab's primary identification for a sample.

* DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.

* CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.

* QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.

  QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.

* All Lab Control Samples, Method Blanks, Duplicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7098
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0359

PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches in one Sample Delivery Group (SDG) with information necessary to check the completeness and consistency of the SDG.

The following notes apply to this report:

* The preparation batches are shown in the same order as the Method Summary Reports are printed.

* Only analyses of planchets relevant to the SDG are included.

* Each preparation batch should have at least one Method Blank and LCS in it to validate client sample results.

* The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

  These qualifiers should be reviewed as follows:

  X Some data has been manually entered or modified. Transcription errors are possible.

  P One or more results are 'preliminary'. The data is not ready for final reporting.

  2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

  Other lab defined qualifiers may occur. In general, these should be addressed in the SDG narrative.

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WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

* TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.

* SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.

* The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.

* PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.

* For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

* The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

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D A T A S H E E T

The Data Sheet Report shows all results and primary supporting information for one client sample or Method Blank. This report corresponds to both the CLP Inorganics and Organics Data Sheet.

The following notes apply to this report:

* TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.

* The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

  The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.

* ERRORs can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.

* A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.

* When reporting a Method Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Method Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

U The RESULT is less than the MDA (Minimum Detectable Activity).

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If the MDA is blank, the ERROR is used as the limit.

J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.

B A Method Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.

Normally, B is not assigned if U is. When method blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.

For each sample result, all Method Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.

L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.

H Similar to 'L' except the recovery was high.

P The RESULT is 'preliminary'.

X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.

2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.

Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

* An MDA is underlined if it is bigger than its RDL.

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* An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA may not be a good estimate of the 'real' minimum detectable activity.

* A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.

* When reporting a Method Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

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LAB CONTROL SAMPLE

The Lab Control Sample Report shows all results, recoveries and primary supporting information for one Lab Control Sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.

* An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

  An amount added is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

* REC (Recovery) is RESULT divided by ADDED expressed as a percent.

* The first, computed limits for the recovery reflect:

  1. The error of RESULT, including that introduced by rounding the result prior to printing.

     If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

  2. The error of ADDED.

  3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

* The second limits are protocol defined upper and lower QC limits for the recovery.

* The recovery is underlined if it is outside either of these ranges.

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DUPLICATE

The Duplicate Report shows all results, differences and primary supporting information for one Duplicate and associated Original sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. This applies both to the Duplicate and Original sample data. Refer to the Data Sheet Report Guide for details.

  If the Duplicate has data for a TEST and the lab did not do this test to the Original, the Original's RESULTs are underlined.

* The RPD (Relative Percent Difference) is the absolute value of the difference of the RESULTs divided by their average expressed as a percent.

  If both RESULTs are less than their MDAs, no RPD is computed and a '-' is printed.

  For an analyte, if the lab did work for both samples but has data for only one, the MDA from the sample with data is used as the other's result in the RPD.

* The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTs prior to printing.

  If this limit is labeled TOT, it includes the preparation error in the RESULTs. If labeled CNT, it does not.

  This value reported for this limit is at most 999.

* The second limit for the RPD is the larger of:

  1. A fixed percentage specified in the protocol.

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2. A protocol factor (typically 2) times the average MDA as a percent of the average result. This limit applies when the results are close to the MDAs.

* The RPD is underlined if it is greater than either limit.

* If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

  Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

* The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

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MATRIX SPIKE

The Matrix Spike Report shows all results, recoveries and primary supporting information for one Matrix Spike and associated Original sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. This applies both to the Spiked and Original sample data. Refer to the Data Sheet Report Guide for details.

  If the Spike has data for a TEST and the lab did not do this test to the Original, the Original's RESULTs are underlined.

* An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

  An amount is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

* REC (Recovery) is the Spike RESULT minus the Original RESULT divided by ADDED expressed as a percent.

* The first, computed limits for the recovery reflect:

  1. The errors of the two RESULTs, including those introduced by rounding them prior to printing.

     If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

  2. The error of ADDED.

  3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

* The second limits are protocol defined upper and lower QC limits

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for the recovery.

These limits are left blank if the Original RESULT is more than a protocol defined factor (typically 4) times ADDED. This is a way of accounting for that when the spike is small compared to the amount in the original sample, the recovery is unreliable.

* The recovery is underlined (out of spec) if it is outside either of these ranges.

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METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

* Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

  There should be Lab Control Sample and Method Blank results in each preparation batch since this close correspondence makes the QC meaningful. Depending on lab policy, Duplicates need not occur in each batch since they QC sample dependencies such as matrix effects.

* The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

  The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

* If a result is less than both its MDA and RDL, it is replaced by just 'U' on this report. If it is greater than or equal to the RDL but less than the MDA, the result is shown with a 'U' flag.

  The J and X flags are as on the data sheet.

* Non-U results for Method Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Method Blank Report has supporting data.

* Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data'

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means no amount ADDED was specified. 'LOW' and 'HIGH' correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

* Duplicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this duplicate. 'OUT' corresponds to when the RPD is underlined on the Duplicate Report. See this report for supporting data.

* If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.

  MDAs are underlined if greater than the printed RDL.

* Aliquots are underlined if less than the nominal value specified for the method.

* Prepareation factors are underlined if greater than the nominal value specified for the method.

* Dilution factors are underlined if greater than the nominal value specified for the method.

* Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.

* Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.

* Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.

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* Count times are underlined if less than the nominal value specified for the method.

* Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.

* Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.

* Days Held are underlined if greater than the holding time specified in the protocol.

* Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

For some methods, ratios as percentages and error estimates for them are computed for pairs of results. A ratio column header like '1÷3' means the ratio of the first result column and the third result column.

Ratios are not computed for Lab Control Sample, Method Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant

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results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included. No sums are computed for Lab Control, Method Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.